Fisheries and Oceans Canada | Pêches et Océans Canada
Science | Sciences
Central and Arctic Region
Canadian Science Advisory Secretariat
Science Advisory Report 2011/065

TECHNICAL REVIEW OF BAFFINLAND'S MARY RIVER PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

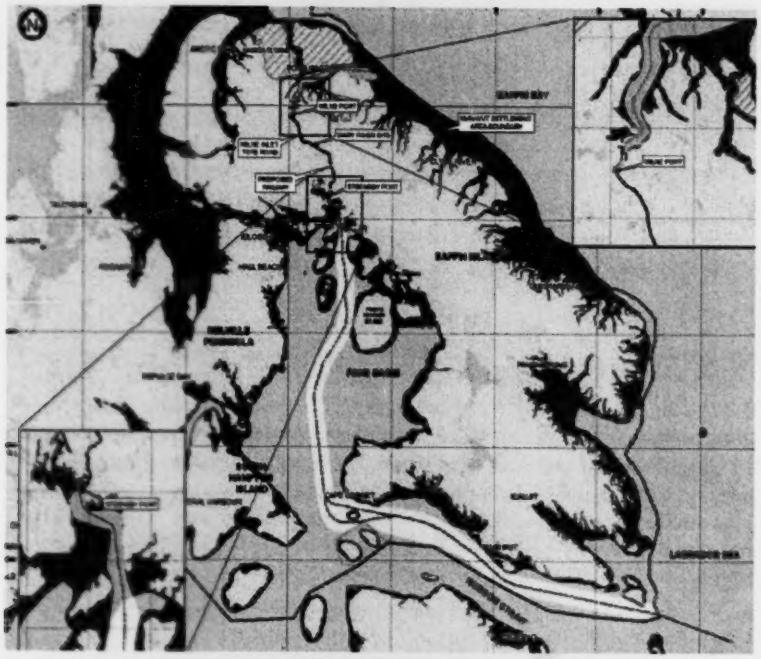

Figure 1: Map of the Baffinland Mary River Project including mine site, port locations and shipping routes (from Baffinland draft EIS figure 1-1.1).

Context :

The Mary River Project is a proposed iron ore mining operation in Nunavut. The mine is located at Mary River on North Baffin Island. The construction phase of the project could commence as early as 2012 and would require about four years to complete. Operations would involve mining high grade iron ore, crushing and screening, rail transport and marine shipping of the ore to market, mostly in Europe. Two port facilities would be constructed, in Milne and Steensby inlets.

Since 2005, Baffinland Iron Mines Corporation (Baffinland) has conducted baseline studies which form the basis of their draft Environmental Impact Statement (EIS) for the Mary River Project. These studies cover the terrestrial, freshwater, atmospheric and marine environments, as well as socio-economic conditions and land use. The Baffinland draft EIS has been submitted to the Nunavut Impact Review Board (NIRB) for detailed environmental and socio-economic review. Fisheries and Oceans Canada (DFO) is one of a number of organizations responsible for conducting a technical review of the EIS. To that end, Ecosystems Management sector within Central and Arctic Region of DFO requested advice from the DFO Science sector to assist them with reviewing the Baffinland EIS, especially the potential impacts of ice-breaking/shipping activities on the marine environment, including marine mammals.

Canada

SUMMARY

- Baffinland's draft Environmental Impact Statement (EIS) does not contain sufficient information to support the Proponent's conclusions about Project effects on the marine environment.
- The proposed year-round shipping through Foxe Basin and Hudson Strait is unprecedented and these areas are important for bowhead whale, narwhal, beluga, and walrus stocks.
- The results of baseline studies presented are inadequate to assess potential Project effects or to be used to monitor Project effects in the marine environment.
- Many key components of the ecosystem get limited or no consideration in the report. For example, there are no credible marine organisms other than marine mammals included as Valuable Ecosystem Components, which means there is no discussion of indirect or trophic effects.
- There is potential for significant residual impacts from the Project on the marine environment that have not been adequately assessed in the draft EIS. Vessel traffic and icebreaking, oil spills, ballast water, wave action, sediment redistribution, shipping and aircraft noise are not adequately assessed in the report. There was no discussion of fuel spills in ice, sub-lethal effects or delayed mortality resulting from Project effects, or quantitative cumulative effects analysis.
- The information presented in the draft EIS and the methods applied by the Proponent do not support the rejection of an eastern Baffin port based on the assessment of environmental impacts at this stage.
- The draft EIS lacks a thorough assessment of alternative shipping routes, the extent of area directly impacted by the Project, and transboundary effects.
- An alternative eastern Baffin port location may result in fewer impacts on marine mammals and, therefore, represent a better option for current and future development of industrial activities on Baffin Island.

BACKGROUND

The Mary River Project is a proposed iron ore mining operation. The mine would be located in the Canadian Arctic on northern Baffin Island, Nunavut (Fig. 1). The Project includes port development proposed for Steensby and Milne inlets, an all-weather road from the Milne Inlet Port to the mine, a year-round railroad line from the Steensby Port to the mine and a year-round shipping route through Foxe Basin and Hudson Strait. Following initial submission of the draft EIS, the function of the Milne Port was changed from full-time to periodic use during the open-water season. It would receive oversized equipment and materials and would not be used to ship iron ore. The port at Steensby Inlet, in northeastern Foxe Basin, would accommodate the cape size ice-breaking vessels designed to transport ore to market. One of the proposed fleet of massive ore carriers would transit Foxe Basin and Hudson Strait approximately every two days year-round, resulting in 3-4 carriers in this region at all times. Based on the ore reserves currently identified, the mine would operate for 21 years; duration of the Project, from the start of construction activities to post-closure, is expected to be 33 years. Additional ore deposits however have been identified in the Mary River area.

The Nunavut Impact Review Board (NIRB) assesses the potential impacts of proposed development in the Nunavut Settlement Area. The Board conducts the review and sets the agenda for the process. Baffinland Iron Mines Corporation (Baffinland) prepared the draft EIS

for development of the Mary River Project. The draft EIS was submitted to the NIRB for detailed environmental and socio-economic review on 21 January 2011. NIRB assessed the submission for conformity with their EIS guidelines. On February 15, 2011 the NIRB initiated the technical review process beginning with the submission of Information Requests (IRs) to NIRB by 17 March 2011. The IR phase is meant to identify gaps within the draft EIS that need to be addressed so that parties can undertake their technical reviews. DFO Science staff met to discuss IRs on 7 March 2011 which were considered by DFO Habitat Management for inclusion in the DFO submission. Baffinland responded to some of the IRs, updated their draft EIS and met with various interested parties on a number of occasions up to the end of July 2011 to discuss concerns. Meanwhile, on 5 July 2011 NIRB initiated the Technical Review phase of the process and requested the technical review comments be submitted by 5 September 2011. The Qikiqtani Inuit Association (QIA) requested and was granted a one-month extension to the technical review period. As a result all submissions were due to NIRB by October 5, 2011. DFO Science staff met on 19 September 2011 to discuss the draft EIS technical review. A near-final version of the research document was provided to DFO Habitat Management on 27 September 2011, for consideration in the DFO submission.

ANALYSIS

At the IR stage of the technical review, Science submitted IRs on ballast water, lower trophic levels, shipping, marine fishes, freshwater fishes, marine mammals, sound, monitoring, cumulative effects, bathymetry, climate change, and sea ice (see DFO 2011). The technical review was conducted by DFO Science staff between 5 July 2011 and 27 September 2011 based on material made available by Baffinland in time to be included (up to 2 September 2011). Some information developed during the IR phase was also included in the technical review. The technical review from Science focuses primarily on potential impacts of the Project on the marine environment and especially marine mammals along the Foxe Basin/Hudson Strait shipping route. Comments on the general presentation of the draft EIS are included in response to specific NIRB guidelines. Detailed technical review comments are included in Stewart et al. 2011 with the full list of cited material. This Science Advisory Report summarizes the main conclusions of the Science review.

Overview

Several common areas of concern were identified by organizations reviewing the draft EIS based on discussions during the technical review period. They relate to ballast water, transboundary issues, valued ecosystem components, baseline studies, environmental impacts/effects assessment, proposed mitigation, shipping routes, noise, and alternative assessment of port locations. Our technical review largely focused on these areas.

Alternatives Assessment

Port Location

The Proponent evaluated alternative port locations based on a series of criteria (technical feasibility, cost implication in terms of implementation, potential impacts to the environment, community acceptability or preference, enhancing socio-economic effects and amenability to reclamation) and a ranking method. Steensby Inlet was identified as the preferred port location.

The information presented in the draft EIS and the methods applied by the Proponent do not support the rejection of an eastern Baffin port based on the assessment of environmental

impacts at this stage as there were errors and inconsistencies in how the criteria were applied. According to NIRB guidelines the EIS serves as the means of assessing the environmental impact of project proposals, and is not meant to justify decisions already made. Resources are not to be committed that would prejudice selection of alternatives before making a final decision. Considering the non-negligible impacts of a port in Foxe Basin on the marine environment and marine mammals, and the much lower environmental impacts we anticipate for an east Baffin port, the Proponent should undertake a re-evaluation of an eastern Baffin port option (such as Port "F"), taking care to apply the same criteria values as applied to similar options elsewhere and considering the impacts on marine mammals. The re-evaluation should also include alternative port locations not examined so far, at lower latitudes (e.g., closer to Clyde River), where terrain elevation at port sites are appropriate, fjords are not as narrow, and should consider ships with modern alternate designs more appropriate for an eastern Baffin port (possibly PC 3 or PC 2).

Most of the eastern Baffin region is occupied only seasonally by beluga (*Delphinapterus leucas*), narwhal (*Monodon monoceros*), and bowhead whales (*Balaena mysticetus*), and walrus (*Odobenus rosmarus*) are less abundant there than in Foxe Basin. Even if the eastern Baffin port choice impacted all resident ringed seal (*Pusa hispida*) and bearded seal (*Erignathus barbatus*) in the area, it would impact significantly fewer marine mammals than in the currently proposed location. There is a potential for reduction in environmental impacts to marine fauna related to noise and ice habitat disruption caused by large ore carrier transits for eastern Baffin port sites compared with transits through Hudson Strait and Foxe Basin. The choice of a port site with minimal environmental impacts is particularly crucial in the context of the anticipated increase in production and eventual exploitation of other ore deposits, as it will lead to further increase in icebreaker transits and will exacerbate environmental impacts. Further, since the eastern coast port site options are within fjord systems, it is highly likely that the area of underwater ensonification during construction, operation, and decommissioning of a port in one of those locations would be smaller than the Steensby Inlet site (which is more open).

Evaluation of alternative port sites should not be based solely or primarily on economic factors, but rather the potential to reduce the environmental impacts of the proposed project.

Shipping Route

In northern Foxe Basin, the Proponent has indicated that ships will pass either to the west (Option A) or the east (Option B) of the Spicer Islands, Rowley Island, and Koch Island. Of these two within Foxe Basin, the eastern route (Option B) is preferred by DFO Science (and others) over the western route (Option A) to reduce disturbance to important marine mammals and their habitat. Preliminary bathymetric data Baffinland provided to DFO Science however indicates that the actual shipping route in northern Foxe Basin has not been determined as there are areas leading into Steensby Inlet along the eastern route (B) that are too shallow to accommodate passage of a large, loaded ore carrier.

Two shipping corridors were assessed through western Hudson Strait. The Proponent indicated that ships will either pass north of Mill Island (Option C) or between Mill Island and Salisbury Island (Option D). They have agreed to use option D to the extent possible, in keeping with the request from the community of Cape Dorset, except when ice conditions are very poor. Although information on walrus distribution indicates Option C might be preferred, beluga (western Hudson Bay population), narwhal (Northern Hudson Bay population) and bowhead whales use both routes during migration and/or wintering. The draft EIS does not provide sufficient information about marine mammal distribution and abundance to evaluate impacts of shipping route options C and D in western Hudson Strait.

There is uncertainty as to where ships will actually travel en route to and from the port locations thus the probable extent of area impacted by shipping is unknown. Based on the draft EIS, the shipping route is defined but necessarily flexible and significant deviations from the illustrated route are planned, but were not evaluated. No impact assessment of the "route" can be conducted until the frequency of deviations from "nominal" and their probable locations can be examined. Given weather and ice are the main determinants of whether the nominal route is safe, the frequency and degree of diverging from the nominal route should be modelled. Groundings were dismissed in the draft EIS on the basis that ships in the designated corridor would not ground, however, given that there is an expectation that some shipping will occur outside the designated route, the risk assessment of groundings should be revisited.

Although the draft EIS indicates that the ships will follow established shipping routes, for the most part the established routes through Hudson Strait are in the Nunavik Marine Region of Northern Quebec. The draft EIS suggests that icebreaking activities in Hudson Strait would not impact marine mammals because no adverse effects have been documented from other shipping activity in this area. However, between 2005 and 2008 the number of ships arriving at Deception Bay for the Raglan Mine only numbered between four and nine per year. Therefore the size and frequency of ore carriers that would travel through Hudson Strait and Foxe Basin for the Mary River Project would greatly exceed any current shipping activities in Nunavut or Nunavik. Moreover, the existing southerly routes avoid the biologically sensitive polynyas off the south coast of Baffin Island. For this reason, the impacts of shipping in Hudson Strait on marine mammals should be thoroughly assessed.

In summary, it is clear that shipping is likely to occur west of Koch, Rowley, and the Spicer islands, as well as north of Mill Island at the western end of Hudson Strait, and in Nunavik waters. Given most of these shipping routes are new, not existing, and the scope of proposed shipping activity is significantly greater than current levels, an impact assessment for all probable shipping routes should be undertaken.

Proponent's Assessment Methods

Scope of Assessment

The qualitative definition of the local study area (LSA) is circular and biased and, since it is based on the extent of expected impacts, can not be used to exclude non-Nunavut waters. Quantitatively, the presentation of the LSA in the draft EIS is ambiguous and contradictory so it is not clear what area was included in the various calculations presented in the document. It is therefore not possible to evaluate the Proponent's assessment. In addition, LSAs are not applied to each biophysical component (e.g., breeding aggregations, birthing or nursing areas) as stated by the Proponent.

The Proponent should use the source features or biological features that may be impacted to define the geographic scope of the assessment area. Several options are available. For example, walrus or a marine mammal with better sound detection capabilities could be used to define the area within which marine mammals might be impacted. For the marine mammal biophysical component, the LSA would equal the Regional Study Area (RSA) with the addition of Coats and Mansel islands in Hudson Bay. Or the maximal distribution of the potentially impacted organism could be used. Hudson Bay narwhal and beluga, and Foxe Basin bowhead whales, will be impacted as they pass through or reside during winter in Hudson Strait. The maximal distribution of these species could be used to define the area of impact which would

include Hudson Bay since consequences of impacts in Hudson Strait may not be seen until the animals have left that area.

The Proponent set quantitative thresholds for assessing Project effects within the RSA. For example, a 10% (arbitrary) threshold at the population level was identified in the draft EIS for walrus exhibiting strong disturbance and avoidance reactions in the RSA. Yet the Proponent examined impacts in the RSA in only a qualitative manner, so there are no quantitative baseline data by which to measure population-level impacts for the RSA (e.g., walrus population). It is not possible to use qualitative data for the RSA to assess whether a quantitative threshold has been exceeded.

Valuable Ecosystem Components (VECs) – Marine Ecosystems

The Proponent acknowledged that bearded seals are a notable component of the ecosystem and that this species has distinct biological attributes relative to other pinnipeds in the RSA that may make it susceptible to effects from the Project. Therefore bearded seal should be included as a VEC in the EIS.

There are no credible marine organisms other than marine mammals included as VECs. Arctic Char are not present in the marine system year-round and have limited value as an indicator of impacts to the marine ecosystem. There is no discussion of indirect or trophic effects in the draft EIS. The Proponent is unable to make predictions about impacts on marine forage species (fishes or invertebrates) that are clearly of ecological importance. The limited survey/sampling was confined to the port locations and was not undertaken along the shipping route. The draft EIS contains insufficient baseline data to either predict effects or to monitor changes in lower trophic levels, which have higher turnover rates and are therefore faster to react to potential changes than marine mammals. For that reason, monitoring forage species could serve as early warnings for marine mammal VECs.

The Proponent should identify additional VECs to fill in obvious gaps in the current list. These should include appropriate food-chain indicators (e.g., *Boreogadus saida*, *Mallotus villosus, Mya truncata*), and the bearded seal. Surveys of marine forage species should be undertaken following acceptable protocols so that detailed quantitative analysis can be used to monitor species and community trends.

Food Chain/Trophic Considerations

The draft EIS as currently written does not assess impacts of the Project on the food chain within the LSA, especially along the shipping route. Impact of ice disruption on the epontic (under-ice) community is not discussed. The Proponent should assess these impacts. Baseline quantitative surveys should be undertaken before project activities begin, and these should be designed to allow regular monitoring once the project starts.

VECs – Sea Ice

The current assessment of sea ice impacts is inadequate. The Proponent should undertake re-analysis of the sea ice information considering the potential impacts of climate change, and the ecological role of sea ice and how it might change over the life span of the Project. It should also include Hudson Strait in its scope of analysis. The correct size of the LSA should be identified and that, together with a more realistic area of disturbance than a single track width, should be included in the re-analysis. The standards for ice-habitat disruption for pack and fast

ice, and evidence that ship-made leads in pack ice will quickly return to a pre-disruption state, should be provided. The more sensitive landfast ice should be included in the analysis.

Oil Spills

In the draft EIS oil spill analysis is limited to summer (open water) months within the proposed shipping lane and defines a worse case spill as one that releases 10% of the fuel onboard. A more complete oil spill analysis that considers temporal and spatial variation in oceanographic conditions is needed for impact assessment. There is no information on the fate of a diesel fuel spill that is (a) large, (b) in ice, or (c) large and in ice. A more realistic worst-case scenario would be a large spill in winter when cleanup would be difficult and environmental impacts greatest.

Avoidance

Avoidance, meaning self-exclusion from an area of disturbance, is displacement and has logical consequences for the animal. The draft EIS has not addressed the issue of displaced animals moving into unsuitable or already-occupied habitat. Consequently, the impact assessment presented is inadequate in this instance. Also, the Proponent's assertion that all displacement is temporary is unsubstantiated. A thorough analysis of displacement-based impacts and follow-up monitoring is needed.

Thresholds

Thresholds of 10% are used throughout the draft EIS yet this threshold level is not supported in the draft EIS by discussion of its merit or literature citations. DFO science advice supporting marine mammal management currently uses Potential Biological Removal (PBR) to examine sustainable anthropogenic-induced mortality rates. For walrus, PBR is approximately 1-2% of the minimum population estimate and currently the main sources of human-induced mortality of walrus are hunting and climate change. Potential mortality arising from the proposed Project will be in addition to the current sources of removals. The threshold rule (at whatever level is justifiable) must be applied to the segment of the population being impacted. The Proponent has provided estimates of neither the size of various components of the population nor the size of the total population of marine mammals, including walrus, in the RSA.

Limiting the possible sources of mortality is not justified. Sources of considered mortality should be expanded to include at least oil spills, disruption of the food chain, increased risk of predation, and increased competition resulting from increases in animal density during displacement. Ship strikes should also be considered a potential source of marine mammal mortality. This is particularly relevant for breeding ringed seals in lairs, and bowhead whales.

The suggestion in the draft EIS that no marine mammal mortality is expected for any species other than ringed seal seems overly stringent and unrealistic. The Proponent should examine sub-lethal effects and delayed mortality that has been documented to result from, for example, episodic disturbances on walrus haulout sites. The effect of chronic disruption (masking/interference) of key mother-young acoustic communications and the energetic effects of repeated displacement although harder to quantify should be discussed.

It seems clear there will, over the life of the Project, be some marine mammals that die (directly or indirectly) as a result of the proposed Project activities. This should be adequately represented in the final EIS and sources of mortality other than walrus stampedes, such as underwater blasting and ship-strikes, must be addressed more thoroughly.

The scope of the Project is vast. This could exacerbate potential impacts on marine mammals especially because such an operation has not occurred in this area before, a number of potentially-impacted species are being considered for listing under the *Species at Risk Act* (SARA), and baseline data for abundance, distribution, and behavioural reactions to disturbing sound levels are limited or do not exist. Currently, there are no data by which to assess trends in marine mammal populations in the study area or any food chain indicators which might provide early warning, because none was examined. Overall, as the draft EIS is currently written, there appears to be no consequences, however hypothetical, for exceeding an impact threshold. The Proponent should clearly outline what types of "corrective measures" will be enacted and for what activities, and what would constitute a successful "correction". Further, there is no indication what operational options (if any) exist if the proposed, future examination of the effects of shipping indicates that it has a high probability of resulting in significant biological impacts to species such as beluga, narwhal, bowhead whales, walrus, and bearded seals in Hudson Strait in winter. The Proponent should clearly describe the monitoring and mitigation strategies that will be used.

Residual Effects

The proponent should employ a holistic approach to the evaluation of residual effects, rather than evaluating each attribute in isolation and basing the overall residual effect on the least significant result. We also recommend assessing residual effects for multiple species by area along the full extent of the shipping route, or at least in and around polynyas especially in Hudson Strait where species at risk aggregate during winter.

Effects of the Project on Marine Fishes, Marine Mammals, and Marine Habitat

Baseline Studies

There are no population estimates presented for any LSAs or RSAs so the Proponent is unable to predict or assess the proportion of the population impacted. The methods used are insufficient to make such estimates except perhaps for ringed seals. Although there is not a standard survey method adopted internationally for walrus, and this species is notoriously challenging to survey, an open water visual survey is not among methods considered applicable. Survey techniques considered appropriate would target hauled-out walrus. Most marine mammal surveys are too insensitive to detect a decline of 10% per annum except possibly for hauled-out pinnipeds. When baseline population estimates are available, they should be presented with confidence intervals.

The Proponent could suggest indices to be monitored, with supporting rationale. The surveys conducted to date are inappropriate for use as indices.

To be able to assess which components are being impacted, and what proportion of the estimated size of that component might be impacted, the Proponent will need to determine the proportional distribution of population components.

It is strongly recommend that the Proponent design and conduct baseline surveys for marine mammals, including bearded seals, using species-appropriate methods applied consistently, including replicates and estimates of statistical error, prior to undertaking any further Project development. The list of VECs should include key indicators at lower trophic levels; baseline studies should be conducted for these indicators.

Residual Effects on VECs

Impacts of Shipping – Vessel Traffic and Icebreaking

There will likely be significant residual impacts of Project vessel traffic and icebreaking on bowhead, beluga, narwhal, walrus, ringed and bearded seals. The Proponent should obtain thorough baseline data and use it to re-assess the effects of vessel traffic and icebreaking for all marine mammals, taking into account the concerns identified above. The Proponent planned to slow the speed of vessel traffic in Milne Inlet to mitigate the impacts of vessel traffic. The same approach should be taken along the Foxe Basin route between the south end of Prince Charles Island and Steensby Port.

The current assessment was based on the eastern route in Foxe Basin (Option B) and is not transferable to the western route (Option A). Should the shallow bathymetry near the mouth of Steensby Inlet warrant a change in the shipping route, a new effects assessment would be needed, particularly as the western route does not have any acoustic barriers (e.g., islands) to reduce sound levels for animals in northwestern Foxe Basin.

Impacts of Shipping – Oil Spills

The Proponent mentioned that ingestion and inhalation are pathways for oil to impact marine mammals, without further discussion. Damage to ocular surfaces or interference with olfactory cues was not considered, and the potential for negative impacts from oil was generally dismissed. Potential lethal and sublethal effects should be discussed. There is evidence in the literature of mortality in polar bears linked to oiling and this should be discussed in the draft EIS.

The risk of an oil spill occurring while on the shipping route is deemed to be small by the Proponent. However the draft EIS indicates there would be times when the ships do not follow the nominal shipping route. The possibility there may be a mechanical, electronic or human failure at some point in the 4,000 to 5,000 ore carrier passages over the life of the Project is largely underestimated in the draft EIS. The prospect of a ship striking the seabed or another ship needs to be assessed using national or international records on the frequency and severity of such accidents, especially during Arctic winters, and when ore carriers are planning to pass each other on a regular basis in predictable locations.

As mentioned previously in this document, a more realistic worst-case scenario involving a large spill in winter, when cleanup would be difficult and environmental impacts greatest, should be assessed and presented in the draft EIS. Modelling of oil spills should consider Arctic conditions, behaviour of oil on water at -2°C and calm to high winds at -30°C. Winter conditions need to be assessed for at least three main points along the southern shipping route due to the different features present in northeastern Foxe Basin, southeastern Foxe Basin and Hudson Strait. The area varies greatly in time and space and poses extreme conditions for shipping. These conditions (strong and reversing tidal currents, jumbled ice) must be considered when the Proponent examines the fate of an oil spill in winter and the intermixing of oil and ice. And as there is a real potential for a spill to occur in winter, the proponent should assess impacts on walrus wintering areas.

Impacts of Shipping – Ballast Water

The Proponent should develop a risk assessment that considers the primary source ports and the efficacy of ballast water exchange as a cumulative impact. The final EIS must also evaluate treatment measures that will be used to comply with anticipated regulatory requirements. The final EIS must consider the impacts of ongoing ballast water discharges on lower trophic levels including eggs and larval stages of benthic organisms. Sequential discharges of ballast water

should be modelled to better understand the size and movement of the ballast water lens and its potential impacts on the ecosystem. Finally, a contingency plan should be developed in the event that ballast water exchange or treatment is not effective.

Impacts of Shipping – Wave Action

The Proponent should collect additional baseline oceanographic data throughout the LSA/RSA over a period of two or more years to allow consideration of inter-annual variation. Modelling is needed to determine how often wave events would occur without ships, the sum of energy when two ship wakes coincide and when the ship wake is in harmony with naturally occurring wave-events. Ice roughness caused by repeated passages of ships needs to be considered in the assessment. The impact of wave action on species that inhabit the intertidal or coastal areas should also be evaluated.

Impacts of Shipping – Sediment Redistribution, Contaminants, and Food Chains

The assessment of sediment redistribution is inadequate and doesn't consider the biological effects of re-suspended material on biota including smothering benthic organisms, blocking light, and increasing the turnover rates of nutrients and metals and their implications up the food chain. A more thorough assessment should be undertaken. The final EIS should present a quantitative assessment of sediment disturbance from propeller and thrust wash using velocities and other data applicable to the proposed ship design, over a range of operational modes (open water, light ice, heavy ice, fast ice, etc.). Mitigation measures should be considered to reduce the impact of propeller wash.

Impacts of Shipping – Noise

The Proponent's conclusion that there will be no significant residual impacts of the Project on marine mammals is not supported. The residual impacts analysis for Project effects of shipping noise on marine mammals should be redone taking into account the concerns identified in Stewart et al. (2011). Mitigation measures to reduce masking and noise effects on marine mammals should be proposed. The Proponent should re-evaluate their conclusions regarding the portion of marine mammal populations that might be impacted by using more precautionary density estimates, more precautionary conclusions about sound propagation, and operational overlaps within the Project's components and between other proposed developments in the study area.

Impacts of Aircraft Noise

A more thorough assessment of aircraft noise impacts on marine mammals, in particular walrus, is recommended. In addition, more stringent measures for mitigation should be used at Steensby Port.

Cumulative Effects Assessment (CEA)

No quantitative cumulative effects analysis was presented in the draft EIS. Determination of overall significance of a residual environmental effect resulting from the Project was based on evaluation of a number of attributes and employing professional judgment. The qualitative analysis appears to be based on the assumption that if two or more impacts are each non-significant (NS) then when combined they remain non-significant. The Proponent used 10% as an impact threshold, the value of which was not based on a cited source or precedent. With the approach adopted in the draft EIS, a NS designation for multiple impacts could result in a qualitative assessment of NS+NS+NS=NS whereas a quantitative calculation might be 9%+9%+9%=27%. In the latter case, the overall cumulative effect would, in fact, be significant.

The CEA considers the impacts of a doubling in ore production. While this approach is not appropriate elsewhere in the draft EIS, it is appropriate for the CEA.

CONCLUSIONS

Baffinland's draft EIS does not contain sufficient information to support the Proponent's conclusions about Project effects on the marine environment. Many key components of the ecosystem get limited or no consideration in the report and there is no discussion of indirect or trophic effects. The results of baseline studies presented in the draft EIS are inadequate to assess potential Project effects or to be used to monitor Project effects. Impacts from vessel traffic and icebreaking, oil spills, ballast water, wave action, sediment redistribution, shipping and aircraft noise are not adequately assessed. The draft EIS lacks a thorough assessment of alternative port locations and shipping routes, the extent of the direct Project impacts (Local Study Area) and transboundary Project effects. There is potential for significant residual impacts from the Project on the marine environment that have not been adequately assessed. There needs to be a quantitative analysis in the final EIS considering cumulative effects from multiple project components and from other projects within Nunavut and Nunavik.

With the current state of knowledge about marine mammal behavioural and physiological responses to sounds from anthropogenic activities, such as those proposed in the Baffinland draft EIS, an alternative eastern Baffin port location may result in fewer impacts on marine mammals, and therefore represent a better option for current and future development of industrial activities on Baffin Island.

OTHER CONSIDERATIONS

Construction associated with the Baffinland Project, including Port development and shipping routes, should be considered within an overall development plan for Nunavut.

SOURCES OF INFORMATION

This Science Advisory Report is based on the Fisheries and Oceans Canada, Canadian Science Advisory Secretariat, regional advisory meetings of 7 March 2011 and 19 September 2011 for the Science Review of Baffinland's Mary River Project Draft Environmental Impact Statement. Additional publications from this process will be posted as they become available on the DFO Science Advisory Schedule at http://www.dfo-mpo.gc.ca/csas-sccs/index-eng.htm.

Baffinland Iron Mines Corporation. 2011. Draft Mary River Project Environmental Impact Statement. Vol. 1-10. Unpubl. rep. submitted to the Nunavut Impact Review Board.

DFO. 2011. Proceedings of the Technical Review for Baffinland's Mary River Project draft Environmental Impact Statement (EIS); 7 March and 19 September 2011. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2011/055.

NIRB Nunavut Impact Review Board. 2006. Guide to the preparation of Environmental Impact Statements. Guide 7. 8 p.

Stewart, R.E.A., V. Lesage, J.W. Lawson, H. Cleator and K.A. Martin. 2011. Science Technical Review of the draft Environmental Impact Statement (EIS) for Baffinland's Mary River Project. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/086. vi + 63 p.

FOR MORE INFORMATION

Contact: Kathleen A. Martin
501 University Crescent
Winnipeg, MB
R3T 2N6

Tel: (204) 983-5131
Fax: (204) 984-2403
E-Mail: kathleen.martin@dfo-mpo.gc.ca

This report is available from the:

Centre for Science Advice (CSA)
Central and Arctic Region
Fisheries and Oceans Canada
501 University Crescent
Winnipeg, Manitoba
R3T 2N6

Telephone:(204) 983-5131
Fax: (204) 984-2403
E-Mail: xcna-csa-cas@dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas

ISSN 1919-5079 (Print)
ISSN 1919-5087 (Online)
© Her Majesty the Queen in Right of Canada, 2012

La version française est disponible à l'adresse ci-dessus.

CORRECT CITATION FOR THIS PUBLICATION

DFO. 2012. Technical Review of Baffinland's Mary River Project Draft Environmental Impact Statement (EIS). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2011/065.